DOCUMENT RESUME

ED 038 684 CG 005 230

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TITLE Modification of Achievement by a Simple Technique Involving Parents and Teacher.
INSTITUTION American Educational Research Association, Washington, D.C.; Western Michigan Univ., Kalamazoo.
PUB DATE 2 Mar 70
NOTE 19p.; Paper presented at American Educational Research Association Convention, Minneapolis, Minnesota, March 2-6, 1970

EDRS PRICE EDRS Price MF-$0.25 HC-$1.05
DESCRIPTORS Children, Low Achievers, *Low Motivation, Motivation, *Motivation Techniques, *Parent Participation, *Performance, Students, *Underachievers

ABSTRACT

Seven experiments were conducted to help answer the question, "What can parents and teachers of an underachieving child do to help that child?" Though many school programs exist for such children, many remain underachievers despite absence of serious "emotional" or socio-economic problems. A simple inexpensive technique was designed to raise achievement in those children whose primary problem was low motivation. Its adoption could be initiated by either parents or teachers, since no specialized knowledge and very little effort was required of either party. The technique involved daily dispensing of dittoed notes to the child at school regarding his performance in the area of interest. These notes were taken home and parents arranged reinforcing consequences there. Single-subject design was used. Dependent variables, chosen on basis of individual subject's achievement problems, talking out of turn, and inattentiveness. Six of the seven cases showed significant improvement resulting from application of technique. Four of the cases are presented. Variations of this simple technique should be tried in many schools to determine its general effectiveness. It can be initiated by counselors, psychologists, social workers and principals as well as teachers and parents. It should be applicable to most grade levels, but this remains to be determined. (Author)

Modification of Achievement by a Simple Technique Involving Parents and Teacher

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I want to address myself to the question, "What can the parents of an underachieving child do to help that child improve in his academic work at school?" While the parents of some underachievers are not interested in the fact that their child is an underachiever or in what they might do about it, many parents of underachievers are very interested in helping their child and very open to suggestions as to how they might provide this help. The interested parent will often indicate to their child's teacher, principal, school social worker, remedial reading teacher, counselor, or school psychologist that they would be very happy to help their child if only they knew what to do.

Sometimes school personnel will suggest to the parents that they help the child with his school work at home, in the evening; but many educators have found this method to be unsatisfactory. Parents of an underachieving child are very likely to do more harm than good when they attempt to instruct the child at home, because they expect too much of the child, do not understand the work well themselves, are inconsistent, do the work for the child, or become very punitive. The result often is very unfavorable for the child, the parents and the teacher.

This research was made possible by the financial and moral support of Marland E. Fluhm, Director of Special Education, and Albert L. Bradfield, Superintendent, Kalamazoo Valley Intermediate School District. It was also facilitated by the cooperation of the following personnel in Comstock Public Schools: Larry Lindeman, Ron Reese, and Mainord Weaver, principals; Pat McQueen, Elsie Lewis, Marsha DeHaven, Ruth Hibart, Mary Cole, and Muril Robinson, teachers.

An alternative method by which the parents might help their underachiever would be to motivate him. They could completely avoid the area of instruction, and restrict themselves to activities that would serve to motivate b ·ter academic performance on the child's part. Of course, this idea is not new to parents; most interested parents of underachievers have probably encouraged, cajoled, warned, threatened, and offered sizeable rewards to their child in order to get him to perform. It is probably also accurate to say that most underachievers would really like to do better academically. The basic difficulty that both the parents and the child have is that they do not understand enough about the way human behavior works. Their knowledge of how to arrange the environment so that the child's behavior changes, is inadequate.

Over the past few years a number of researchers have been using their knowledge of how behavior works to rearrange school and home environments in such a way as to produce improved learning and performance in children. Employing principles and techniques of behavioral science, these researchers have modified a wide variety of child behaviors in school settings. For example, Wolf, Giles and Hall (1968) showed that performance in different academic subjects depended upon the amount of reinforcement provided in each subject; Hall and Broden (1967) guided teachers and parents in modifying the "brain-damaged behavior" of three children through manipulation of social reinforcers; Surratt, Ulrich and Hawkins (1969) found that the attentive working behavior of first grade children could be modified by making certain privileges contingent upon attentiveness or inattentiveness; and Madsen, et al (1968) demonstrated that stating of rules has very little effect on classroom behavior, while showing approval of appropriate behavior exerts a great deal of control over classroom behavior.

The motivational manipulations used in these studies differs in several important respects from the kinds of things that parents of the underachieving child are likely to have tried. The person making systematic use of behavioral principles and techniques is not likely to do any cajoling, threatening or persuading. Nor is he likely to use much punishment. He is likely to offer rewards for accomplishment, but the rewards will

usually be small ones offered for very small improvements in performance, and the rewards will typically be given much more immediately and consistently than those given by most parents or teachers.

The parents of the underachieving child are at a disadvantage in carrying out the kind of behavioral engineering used in the studies cited, however. They are in a position that has two serious drawbacks. Though, they can avoid cajoling, threatening, persuading, and punishing, and they can offer small rewards for small improvements in performance; they cannot give the rewards immediately, and they will have difficulty knowing when performance has been adequate to earn a reward. That is, the parents typically cannot be present in the classroom and give immediate rewards; and they need some way to monitor the behavior if they are to give any rewards at all. The studies I wish to describe to you were done to determine whether a practical, inexpensive technique could be devised that would overcome these difficulties.

We located three children in a local school who met the following criteria: their daily performance in one or more academic areas was far below average (though their achievement test scores might not be); their I.Q. scores were average or above; their teachers and parents were willing to try an experiment. I will present just two of these experiments.[2]

EXPERIMENT I: SHERRY

Method

Subject

Sherry was a nine-year-old fourth grader whose work in both social studies and arithmetic was well below her capabilities.

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[2]These studies were conducted by Carroll Dean Smith in partial fulfillment of the requirements for the degree of Master of Arts from Western Michigan University.

Procedure

Baseline. We measured Sherry's performance in both social studies and arithmetic in terms of the percentage of her work she did correctly. In social studies the teacher gave short quizzes several times each week, so we recorded the percent of the questions Sherry got right on each quiz. Written arithmetic assignments were given daily and her accuracy on those assignments was also recorded. For 16 days we made no manipulations, but merely had the teacher score Sherry's social studies and arithmetic papers after school and record these scores for us. We then felt that we had an adequate estimate of her performance in these two subject areas, so we introduced a manipulation.

Child-Parent Feedback. On the 17th day the teacher told Sherry that if she did better work in social studies or arithmetic the teacher would give her a note to take home to her parents. The teacher began correcting Sherry's social studies and arithmetic papers as soon as they were turned in. If Sherry's performance met our criterion in either subject, the teacher would fill out a note and give it to Sherry with the instruction to take the note home and show it to her parents.

The notes were dittoed in advance and simply said "Sherry did very well in arithmetic today" or "Sherry did very well in social studies today." The teacher simply dated and signed the arithmetic note, if Sherry's arithmetic performance met our criteria, and handed the note to Sherry. The same was done for social studies. Sherry was not informed what our criteria in the two subjects were.[3]

This technique was not exactly the one we were most interested in testing; it contained all but one of the elements we were interested in testing. The technique we were most interested in was going to include our arranging for the parents to provide reinforcers at home whenever the child brought home a note;[4] but if we started right out

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[3]The criteria in this phase of the experiment were that she have at least 37 per cent correct in social studies and 46 per cent correct in arithmetic.

[4]The use of weekly token reinforcers (grades) at school that were exchangeable for "backup reinforcers" (money) at home has also been investigated by McKenzie, et al (1968). They measured the effect of this contingency upon attentiveness to reading and arithmetic assignments.

with that technique, and it worked, we would never know whether the reinforcement provided at home was an essential ingredient. Maybe it would be enough for a teacher to merely grade the underachievers work immediately and give the child a note saying he had done well.

We wanted to develop a technique that required as little as possible of a teacher, so we instructed Sherry's teacher not to even use any praise. The teacher was to merely score the child's paper and give her a note, if she had earned it, without commenting to the child, patting her on the back, or giving any other kind of social reinforcement.

After we had continued this condition for nine days, we felt we had sufficient information on its effectiveness, so we moved on to using the technique that we really thought might work.

Reinforcement. Those of you who are familiar with the concept of token reinforcement will recognize that the note given Sherry for good performance was like a token reinforcer. It had no value in itself, but it could be made valuable if it gained the child access to reinforcers. During the Reinforcement phase we arranged for the note to acquire value. We asked the parents to give Sherry certain rewards if she brought home a note. They agreed to give her praise and allow her to play outside before dinner if she brought home one note. If she brought home both notes she was allowed to play outside after dinner as well. She was allowed to play outside on weekends only if she brought home a certain number of notes during the preceding week

As Sherry's performance improved, the criteria for receiving notes were shifted upward.[5]

Results and Discussion

During Baseline Sherry's performance in social studies averaged 37 per cent correct. In arithmetic her performance averaged 47 per cent. She was in the lowest 10 per cent of her class in social studies and the lowest 15 per cent of her class in arithmetic.

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[5]Beginning at 46 per cent and ending at 85 per cent in arithmetic. Beginning at 38 per cent and ending at 72 per cent in social studies.

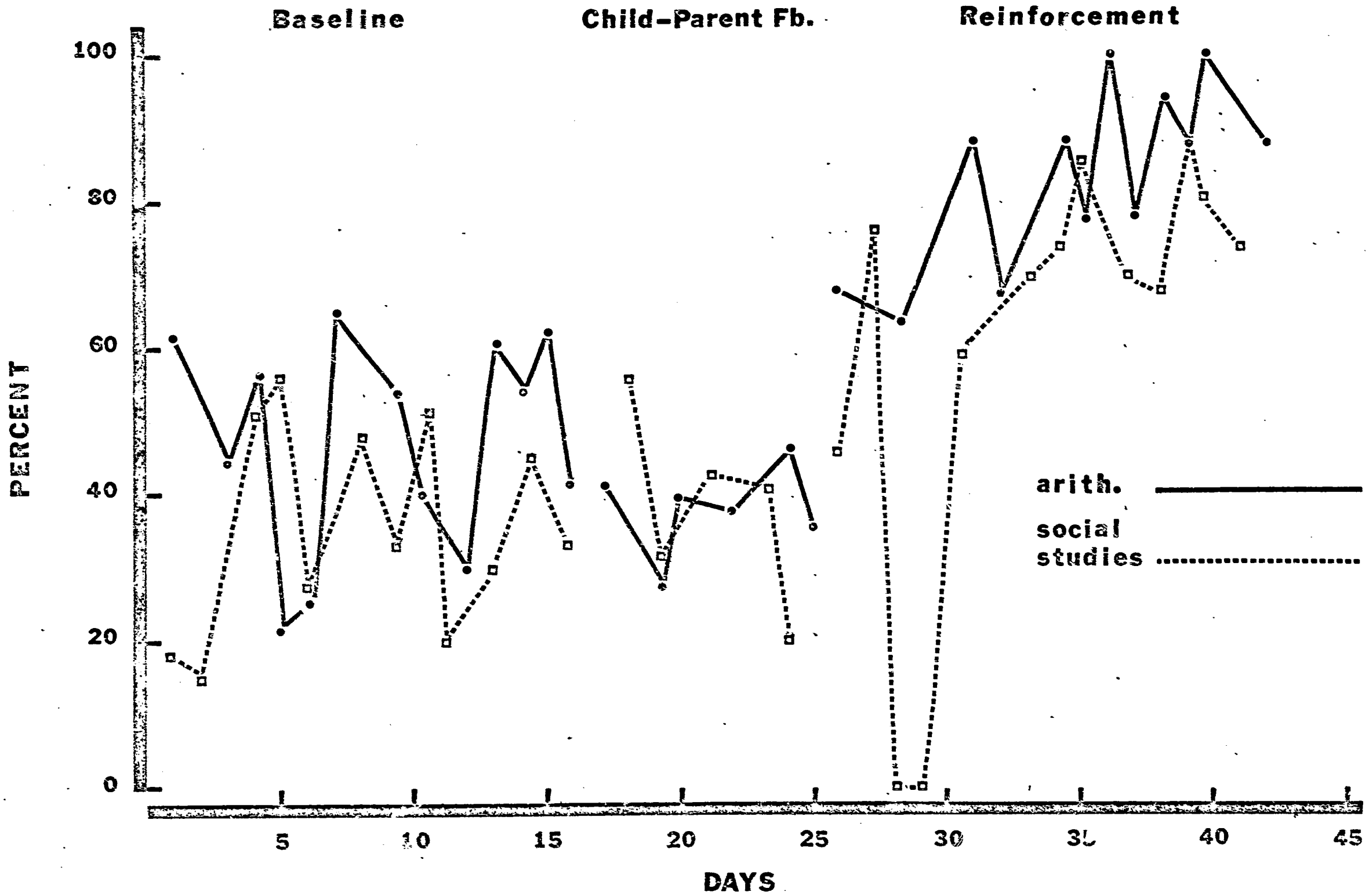

Fig. 1 Sherry's performance in two academic areas under three experimental conditions; no specially programed feedback (Baseline), feedback to the child in the form of notes about good achievement in either activity (Child-Feedback), and home consequences contingent upon bringing home notes. Data indicate what percentage of her written assignment was completed correctly. No data point is shown for an activity on days when that activity did not occur

The conditions of the Child-Parent Feedback phase had no apparent effect on Sherry's performance. Thus, the immediate scoring of her work, and the dispensing of notes to take home was not adequate to change her behavior.

When Sherry's parents informed her of the new contingencies, in the Reinforcement phase, her performance in both subjects improved immediately. Then there were two consecutive days in which her social studies scores were zero. Sherry was a child accustomed to having "her own way," and it is suspected that she was merely "testing" whether her parents actually meant to follow through on the contingencies they stated. They did follow through; Sherry not only lost half of her outdoor privileges on those two nights, but also lost outdoor privileges through the weekend, because those two days were Thursday and Friday.

After that her performance in both social studies and arithmetic improved drastically. By the end of the study Sherry was among the top 10 per cent of the class in arithmetic and in the top half of the class in social studies.

I would like to show you the results of one more experiment like the one with Sherry. This one had a surprise in it for us.

EXPERIMENT II: JIM

Method

Subject

Jim was a six-year-old first grader described by his teacher as "lazy" and "uninterested." His two most difficult subjects were arithmetic and reading.

Procedure

Baseline. For twelve days Jim's scores in both arithmetic and reading (workbook and work sheets) were recorded by the teacher.

Child-Parent Feedback. As with Sherry, we had the teacher give Jim notes for per-

formance above criterion,[6] and he was to take these home to show his parents. The teacher was to give no social reinforcement with the notes. The parents were given no guidance about what to do when Jim brought home notes.

Reinforcement. When we began the Reinforcement phase we talked with Jim's parents to see what they had been doing when Jim brought home notes. We found that they were already doing exactly the kinds of things we had planned to recommend that they do during the Reinforcement phase. They praised Jim when he brought home a note, and they placed it on a family bulletin board. They allowed him to stay up half an hour later on nights when he brought home a note, and on Saturday's he was allowed to watch television until late in the evening if he had received several notes during the preceding week. Other privileges, such as going to the store or going with his father on errands in the car, were occasionally added as reinforcers. When Jim failed to bring home a note, his parents expressed disappointment and questioned him about the reasons for his not receiving a note. We suggested they stop this last procedure, because our experience has been that under some conditions (such as when a child is angry at the parent), lengthy expressions of disappointment and discussions of problems act as reinforcers rather than as punishers or aversive consequences. Other than this one recommendation, we did nothing but encourage the parents to continue what they were doing and be very consistent and enthusiastic in applying the reinforcers.

Jim continued receiving the notes at school for performance above criterion[7] and continued receiving the privileges and social recognition at home as "backup reinforcers."

Results and Discussion

During Baseline Jim got an average of only 13 per cent of his reading answers correct and 52 per cent of his arithmetic (though he typically completed the assignments). He was in the lowest 10 per cent of his class in both subjects. During the

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[6]Initially, criteria were 47 per cent in arithmetic and 15 per cent in reading.

[7]Criteria were gradually shifted and eventually reached 89 per cent in arithmetic and 83 per cent in reading.

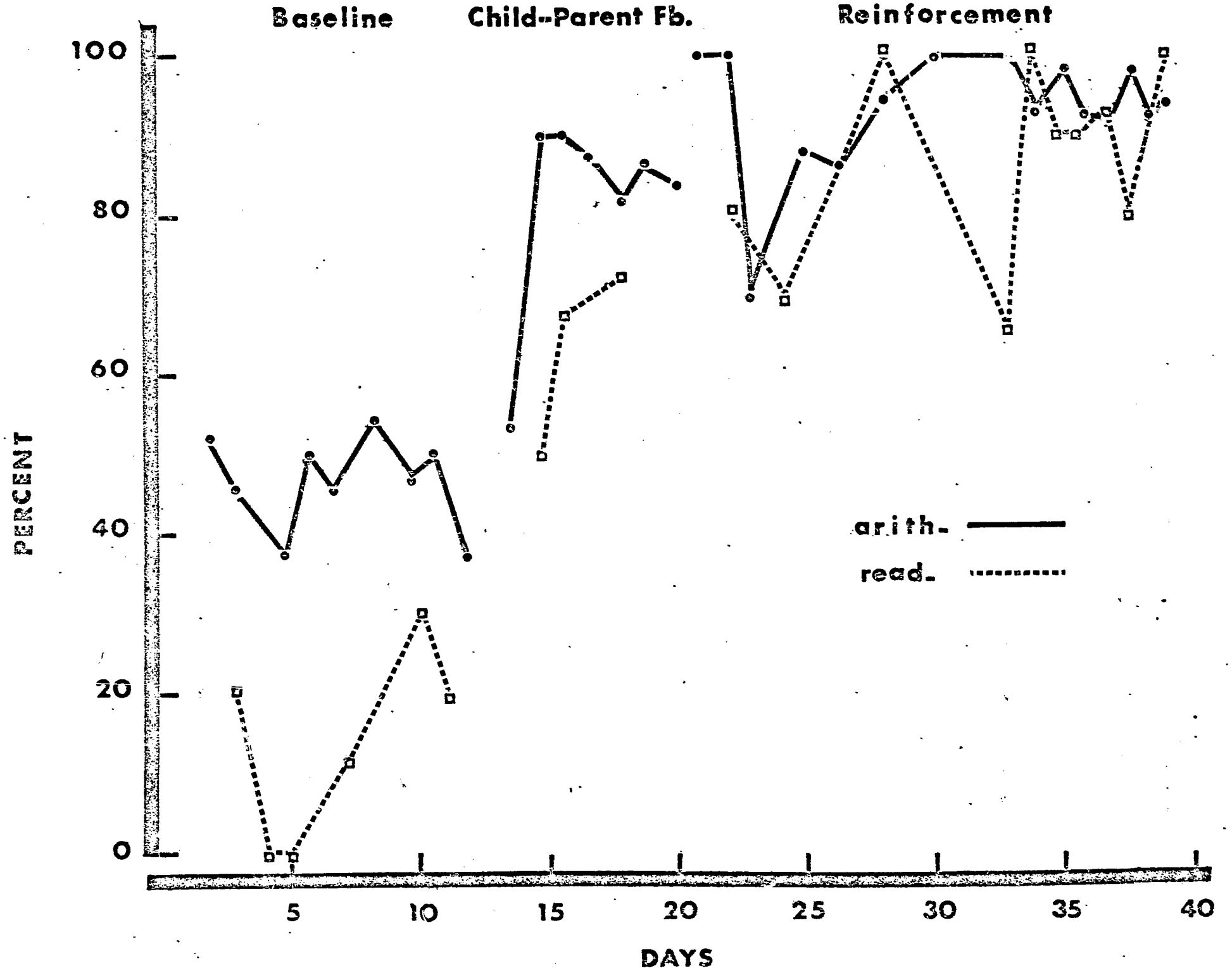

Fig. 2 Jim's performance in two academic areas under three experimental conditions; no specially programed feedback (Baseline), feedback to the child in the form of notes about good achievement in either activity (Child-Feedback), and home consequences contingent upon bringing home notes. Data indicate what percentage of his written assignment was completed correctly. No data point is shown for an activity on days when that activity did not occur.

Child-Parent Feedback condition, his performance in both areas improved greatly. When the Reinforcement phase was begun, the parents were interviewed and it was discovered that they had actually been rewarding Jim in very appropriate ways for his good work. We had expected that none of the parents of these underachievers would spontaneously use consequences that were sufficiently positive and consistent to have much effect on their child's performance, but we were pleasantly surprised in Jim's case.

Our counseling the parents to use only positive reinforcement and be very consistent, during the Reinforcement phase, appears to have brought some further improvement in Jim's academic performance. His arithmetic averaged 84 per cent correct and his reading, 63 per cent. He averaged in the top 20 per cent of his class in arithmetic and the top 20 per cent of his group in reading.

At this point we wondered just how simple and convenient we could make this technique. In those first experiments the reinforcement had been applied to performance in two subject areas at the same time. What if we applied it to only one subject area? And what if we made it even less demanding on the teacher by asking her to give the child his note at the end of the day rather than immediately after the child completed his assignment? Of course one of the basic principles of behavior is that either reinforcement or punishment is more effective the more immediate it is, but we suspected that with verbal human subjects a delayed reinforcement contingency might still be effective enough to bring improvement.[8] We decided to find a few more underachievers and try a delayed reinforcement technique, in which the child did not find out whether he had earned a note or not until the end of the school day. We also decided to apply the contingency to performance in only one subject area.

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[8] Actually, we knew from an earlier study (Schwarz and Hawkins, 1970) that delayed reinforcement could sometimes bring very pronounced changes in behavior.

EXPERIMENT III: DIANNE

Method

Subject

Diane was an 11 year old sixth grader performing poorly in arithmetic and spelling, but not in other subjects.

Procedure

Baseline. We recorded Dianne's performance in arithmetic and spelling. In this and all subsequent studies of academic performance we also determined how the rest of the class was performing, so that we could graph the child's relative standing in the class. That way, we would be more certain that changes in our subject's performance were not simply a reflection of increased or decreased difficulty of the teacher's assignments; for if the assignments became, say, more difficult, everyone's performance should show a decline, and our subject's relative standing in the class would hopefully be unaffected.

Contrary to our instructions, during the Baseline Dianne's parents told her that her poor school work had attracted the attention of a psychologist and that she should work harder. This occurred on day 8, and when we found out about it, we decided to extend the Baseline period longer than planned so that we could determine whether this inadvertent manipulation would have any effect.

Child-Feedback. After a 20 day Baseline, we moved on to the first intentional manipulation, the Child-Feedback condition. Since merely sending notes home with Tim, in the previous study, had resulted in an improvement in his performance, we decided to see whether simply giving Dianne the notes, without letting her take them home, would affect her performance. Every day that no more than 80 per cent of the class scored higher than Dianne in arithmetic, Dianne got a note after school saying "You did well today in arithmetic." Thus she could earn a note only in arithmetic, and this note was not dispensed until the end of the school day, a few hours after the actual behavior upon which it was contingent. The teacher gave her no indication, prior to that time,

of whether or not she had reached criterion for a note (in fact, the teacher did not check the papers immediately and could not give such feedback). After Dianne read the note, she was required to return it to the teacher.

Reinforcement. During the Reinforcement phase Dianne was to receive a small toy, stuffed animal (which she had a collection of) after bringing home two notes, a larger one after the fourth note, and a still larger one after the sixth note. Her parents didn't specify to her what she would receive thereafter.

The teacher continued dispensing notes at the end of the day if arithmetic performance was above criterion.

Results and Discussion

During Baseline, 67 per cent of the class scored higher than Dianne in arithmetic, on the average, and 32 per cent scored higher during spelling. Since her performance after day 8, when her parents urged her to improve, was not clearly better or worse than her performance before day 8, we may conclude that these urgings were ineffective.[9] Showing Dianne a note, during Child-Feedback, without allowing her to take it home had no effect on her relative class standing (see Fig. 3).[10]

When backup reinforcers were provided at home, in the Reinforcement phase, Dianne's class standing in arithmetic improved. Because of the variability of the data, it is somewhat difficult to interpret them by visual inspection, so we ran a Mann Whitney U Test and found that during Reinforcement Dianne's standing in arithmetic was significantly improved over her standing during the Child-Feedback phase. ($P < .002$, $U=2.0$, $N_1=6$, $N_2=11$, two tailed.) Apparently the delay in the note reinforcement did not prevent its affecting the behavior (provided backup reinforcers were given), though its effect was less dramatic than we had obtained on Sherry and Jim with immediate note reinforcement.

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[9]This result is compatible with the finding of Ayllon and Azrin (1964) that instructions often are ineffectual in modifying behavior unless accompanied by appropriate reinforcement or punishment contingencies. Similarly, Madsen, Becker and Thomas (1968) found that the clear, repeated stating of classroom rules had little effect on children's behavior until appropriate consequences were made contingent.

[10]An average of 69 per cent scored higher than she in arithmetic, and 30 per cent in spelling, during Child-Feedback.

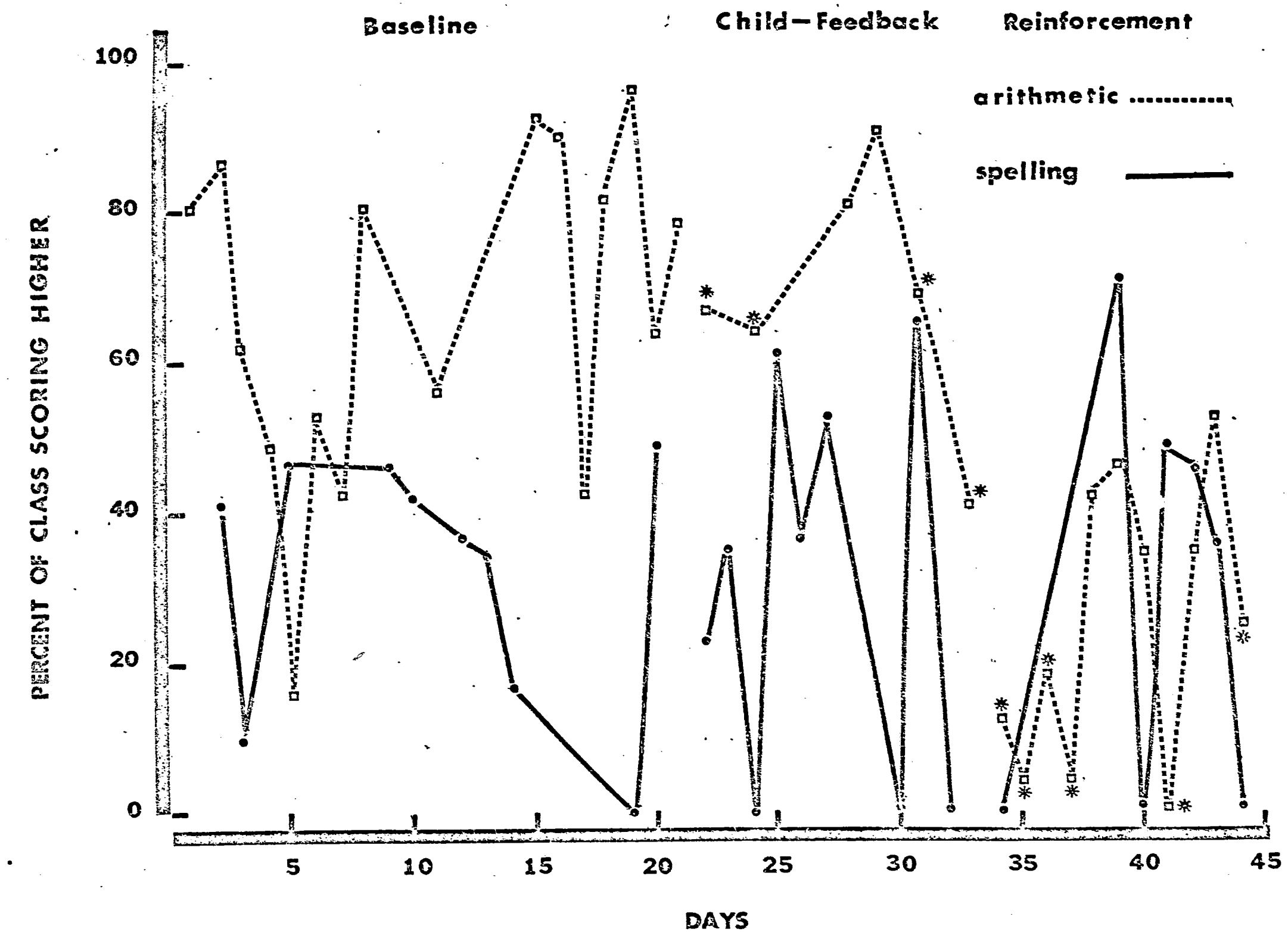

Fig. 3 Dianne's relative performance in two academic areas under three experimental conditions; no specially programed feedback (Baseline), feedback to the child in the form of after-school notes about good achievement in arithmetic (Child-Feedback), and "backup reinforcement" for notes brought home (Reinforcement). No notes were given for good performance in spelling. If one of the activities did not occur, on any particular day, no data point is shown. Data were calculated by determining what percentage of her classmates (in attendance) achieved scores higher than hers on the day's written assignment.

No notes or backup reinforcers were given Dianne for her spelling performance, and, as Fig. 3 shows, her relative performance in that subject was unaffected by the dispensing of notes and reinforcers for arithmetic performance.[11] Thus the effect that we got in arithmetic did not generalize to spelling.

EXPERIMENT IV: TIM

Method

Subject

The last study I want to present today was done with a ten-year-old fourth grade boy whose work in all academic areas was poor. He was inattentive and disruptive in class. We decided not to record his academic performance, but rather to record data on his inattentiveness and his talking out of turn.

Procedure

Baseline. We recorded both Tim's inattentiveness and the related behavior of talking out of turn, by a system we call the ten-second-interval system. For every ten seconds that goes by, the observer merely marked down on his paper a symbol to indicate whether Tim did or did not look away from his work (or the teacher, if that was the relevant place to be looking at the moment, or another child who was reciting) during that interval. We observed for 20 minutes each day, which is 120 ten second intervals. Then we could calculate in what per cent of those intervals Tim was inattentive and in what per cent of the intervals he talked out of turn. The observation was done during a social studies period early in the afternoon.

On ten occasions we checked inter-observer reliability in order to determine whether the regular observer was inadvertently biasing the data in any way. This was done by having a second observer record data independently of the regular observer and then calculating their agreement by dividing one observer's total, for a particular be-

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[11] An average of 25 per cent scored higher than Dianne in arithmetic, and 29 per cent in spelling, during Reinforcement.

havior, by the other observer's total (always dividing the smaller by the larger). When multiplied by 100, this ratio yields a percentage of agreement. On the ten reliability checks the two observers agreed an average of 90 per cent on the frequency of inattention and 92 per cent on talking out of turn.

Child-Feedback. We decided to provide the note consequences only for inattentiveness and only social approval for low rates of talking out of turn. During Child-Feedback Tim received a note after school whenever he was inattentive during fewer than 60 per cent of the ten second intervals in the social studies period. The note said, "You did well today at paying attention during social studies." He was required to return it to the teacher before leaving school. If he showed a low frequency of talking, but still did not meet criterion for inattentiveness, the teacher would say after school, "You did well at not talking aloud today, but you didn't pay attention well enough to earn a note." Other than that, she was to make no evaluative comments to Tim about his inattentiveness or his talking.

Child-Parent Feedback. As in the first two studies, in Tim's case we tried a phase where he was to take home his notes, but his parents were given no instructions about providing backup reinforcement.

Reinforcement. Tim's parents were interviewed and agreed to extend his bedtime one half hour whenever he brought home a note. After bringing home three notes he was to receive a model car, and after eight notes, a baseball glove.

Results and Discussion

The first experimental manipulation, the Child-Feedback condition, seemed to cause the two behaviors to become less variable but only talking out of turn showed any improvement. It declined from 26 per cent to 20 per cent, on the average, as a result of Tim's receiving a note after school that he had to return to the teacher before leaving school.

When Tim took the notes home, during Child-Parent Feedback, both response classes

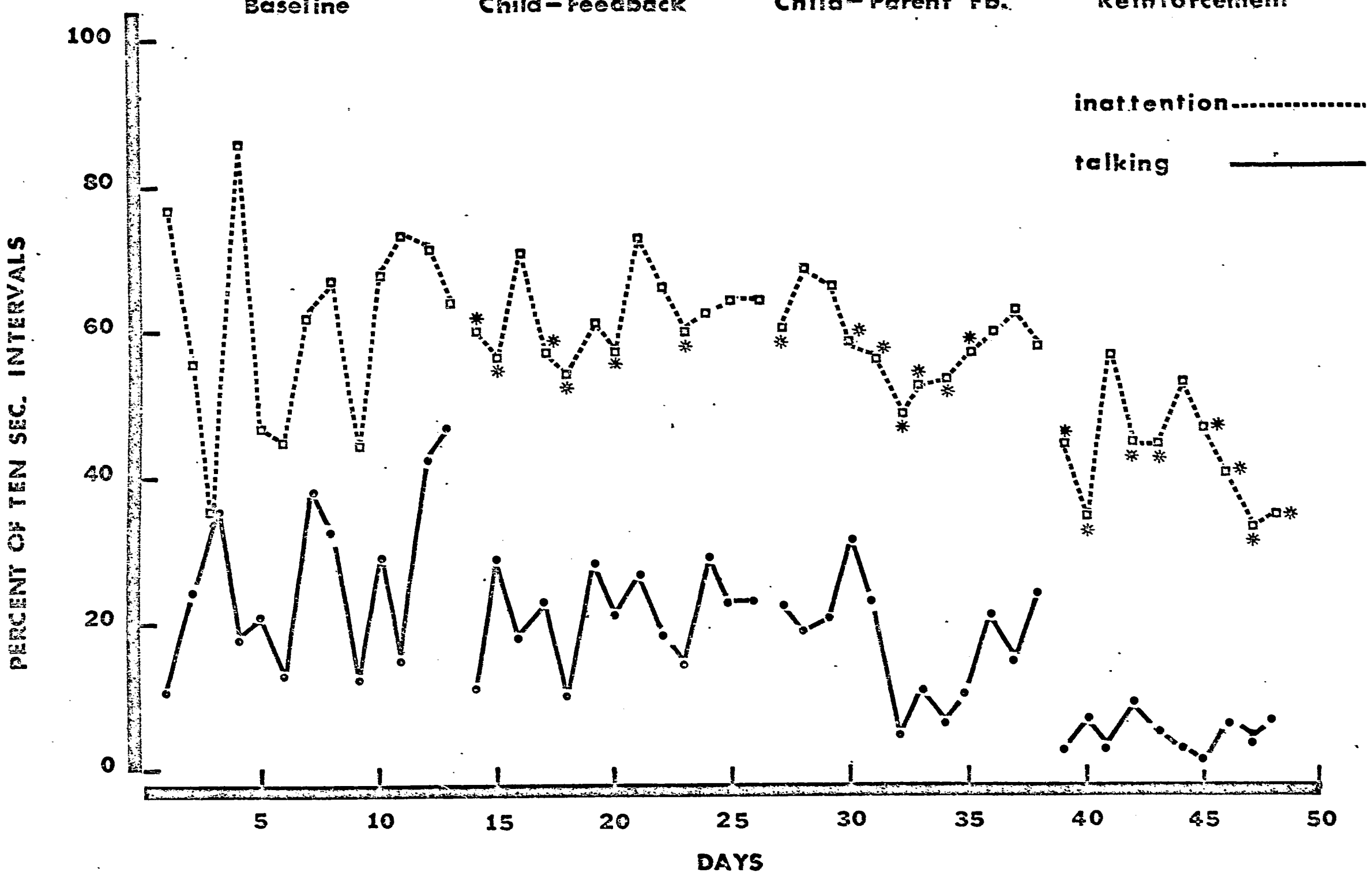

Fig. 4 Tim's inappropriate behavior under four experimental conditions; no special consequences programed (Baseline), notes given Jim after school for relatively little inattentive behavior (Child-Feedback), notes to be taken home (Child-Parent Feedback), and "backup reinforcement" for notes brought home. No notes were given specifically for low rates of talking out. Each day's session was 20 minutes in length and occurred during social studies. Data indicate in what percentage of the 120 ten-second intervals Tim showed any amount of the behavior in question.

improved temporarily and then returned toward their previous level. At the outset of the following phase we learned from the parents that when Tim first began bringing notes home they praised him, but that their consistency in doing this became less as the novelty of the notes wore off. This may account for the temporary improvement during this phase.

The Reinforcement condition produced an immediate improvement in both behaviors, though the note was actually contingent only upon low rates of inattentive behavior and the note was given nearly two hours after the behavior.

General Discussion

Underachievement is a common problem in school children. If this problem can be reduced by such a simple technique as having his teacher give him a note to take home when he does well and helping the child's parents provide appropriate reinforcers at home, it would be well worth the effort. The modest experiments described here give us only a few guidelines, but certainly enough to suggest that school social workers, school psychologists, school principals, teachers, and the parents of an underachieving child would be wise to consider taking the initiative to set up this simple reinforcement system to modify behaviors related to underachievement. So far we know that even a delay of a few hours between the behavior and the token reinforcer (note) does not necessarily prevent the system from working, though our evidence does suggest that the system is less effective this way. We also know that either one or more responses can be modified at once, that with some parents little guidance from school personnel regarding reinforcement is needed, and that the system can be effective with a wide range of ages.

It will require further research and innovation to discover how long these effects last, how quickly you can reduce the frequency and magnitude of the backup reinforcers, what kinds of behaviors cannot be modified with such a system, what characteristics a child must have to make the system applicable, what kinds of reinforcers parents will readily dispense in exchange for tokens, and other such relevant questions.

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